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| **Minor Award Name** | Software Architecture |
| **Minor Award Code** | 5N2772 |
| **Level** | 5 |

**Suggested resources to support delivery:**

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| **Theme/Topic** | **Type** | **Relevance** | **Author/Source** | **Web Link** |
| Software Development | Book | Essential reading on how to apply modern technologies to software projects. Tom’s Trail in the first chapter is a great example of using an iterative method to develop a website. Pictures and questions make it a very readable and informative book. Also very useful appendices on UML, class diagrams, sequence diagrams, users stories and use cases as well as testing. | Head First Software Development  **By:** Dan Pilone and Russ Miles  Published by: O’Reilly 978 0 5 96 52735 8 | <http://shop.oreilly.com/product/9780596527358.do> |
| Information Systems | Article | Comprehensive article about Information Systems: definition, history, components, different types, acquiring and managing information, security issues and impact of information systems. | Encyclopaedia Britannica. Written by Vladinir Zwass | <http://www.britannica.com/topic/information-system> |
| An Agile practical introduction | Group activity | Visual and practical exercise illustrating the difference between the waterfall approach and the agile method in project management. Prepare a model with materials such as Knex, Lego, magnetic parts... and hide it under a sheet. Divide your class into groups and get the first group (customer) to explain the requirements for their model without showing it to the second group. Second group writes the requirements down. You could have another group drawing the model (design) then a fourth group reconstructing the model following the requirements/drawing. A test group can also be added. At the end, the reconstructed model is compared with the original. Discuss what went wrong, how it could have been done differently and what happens if the requirements change in the middle of the process. Great introduction to agile methods, especially for students with little experience of software project management. | Software for Good team | <http://softwareforgood.com/an-agile-example/> |
| Software project management | Cartoon | Illustration on the difficulties of software project management. Great resource for introducing project management to all students, with or without experience of software projects. | Various | <http://www.tamingdata.com/2010/07/08/the-project-management-tree-swing-cartoon-past-and-present/> |
| Waterfall methodology and example | Article | Very clear explanation of the Waterfall method with a real life example | Mars | <https://www.marsdd.com/mars-library/product-development-the-waterfall-methodology-model-in-software-development/> |
| Agile methodology and example | Article | Very clear explanation of the Agile method with same example as the above Waterfall method, allowing comparison between the 2 methods | Mars | <https://www.marsdd.com/mars-library/product-development-using-agile-methodology-for-software-development/> |
| Agile/Waterfall | Blog post | Great post about Agile versus Waterfall with pros and cons of both methods | By Jim Bowes, Manifesto Digital | <http://manifesto.co.uk/agile-vs-waterfall-comparing-project-management-methodologies/> |
| Kanban | Article | An introduction to the Kanban method and comparison with Scrum | By Dan Radigan, Atlassian | <https://www.atlassian.com/agile/kanban/> |
| DSDM | Article | Very clear article about the core concepts of the Dynamic Systems Development method (DSDM). Great explanations and diagrams, easy to understand. | By Marc Clifton, J. Dunlap, Code Project | <http://www.codeproject.com/Articles/5097/What-Is-DSDM> |
| Scrum and XP | Booklet | Promotional booklet from the Serena company but nonetheless very good introduction to Scrum and XP Agile methodologies | Serena | <http://www.serena.com/docs/repository/solutions/intro-to-agile-devel.pdf> |
| Software development methodologies | Article | Great analogy especially for students with little programming experience to help them understand the challenges and difficulties of software development | By Andrew Philips, code project | <http://www.codeproject.com/Articles/124732/Software-Development-Methodologies> |
| Use cases | booklet | Introduction to use cases, explaining what a use case is, the difference with a use case scenario, examples and pitfalls to avoid. Includes UML, sequence diagrams, relationships between use cases <<include>> and <<extend>> | By Jason Gorman from parlezuml | <http://www.codemanship.co.uk/parlezuml/tutorials/usecases/usecases_intro.pdf> |
| UML use case diagram | Post | Simple banking business example illustrating the different elements of a use-case diagram and their relationships | By Tony Loton | <http://www.modernanalyst.com/Resources/Articles/tabid/115/articleType/ArticleView/articleId/2017/EndtoEnd-UML-Use-Case-Diagram.aspx> |
| UML class diagrams | Tutorial | UML introduction, purpose of class diagrams, what is a class diagram and its main elements with clear examples | by Robert C. Martin | <http://www.objectmentor.com/resources/articles/umlClassDiagrams.pdf> |
| UML and programming | Activity | Complete example of Object Oriented analysis, design and programming applied to developing a simple address book | Russell C. Bjork from Gordon College | <http://www.cs.gordon.edu/courses/cs211/AddressBookExample/index.html> |

**Useful Organisations:**

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| **Name** | **Contact Information** |
| Agile Manifesto and principles | <http://www.agilemanifesto.org/> |
| UML resource page from the Object Management Group, not for profit technology standards consortium | <http://www.uml.org/> |

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| **MOOCs (Massive Online Open Courses)** | |
| Free access to online courses  Search regularly for new courses and new start dates | <https://www.mooc-list.com/> |
| Udacity, Software development process course  from Georgia Tech, also available in 3 parts on YouTube  Part 1: importance of software engineering, the different phases of a software project, different methodologies  Part 2: Software development process, objects and classes, class diagrams, UML including use case diagrams, software architecture  Part 3: Failure, fault and error, verification and testing, test cases, testing strategy. Also Agile, XP, Scrum, refactoring | <https://www.udacity.com/course/software-development-process--ud805>  Part 1:  <https://www.youtube.com/watch?v=gBd-ct58DCI&list=PLAwxTw4SYaPkNAtqsKcFkUGpf4j67NBaz>  Part 2: <https://www.youtube.com/watch?v=wHI3j1BWO9c&list=PLAwxTw4SYaPm8PAGH7ov2Bj-nG4sXgCtJ>  Part 3:  <https://www.youtube.com/watch?v=1x-c5d8iUhc&list=PLAwxTw4SYaPkoQFThzsc9e7Fe3QV_KJCs> |
| Podcast: Programming Methodology by Mehran Sahami. Full Java course from Stanford University (free) | <https://itunes.apple.com/ie/itunes-u/programming-methodology/id384232896?mt=10> |
| Code Academy: Learn Java for free | <https://www.codecademy.com/> |

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| **General systems theory** | Website | Gives an introduction to Systems Theory its background and history. Its also gives and introduction to its link with Software and Computing | <http://environment-ecology.com/> | <http://environment-ecology.com/general-systems-theory/137-what-is-systems-theory.html#History> |
| **Systems Theory and Thinking** | Video | Excellent set of videos introducing and explaining Systems Theory and thinking. | Complexity Learning | <https://www.youtube.com/watch?v=dImyZdy2k7g&index=10&list=PLsJWgOB5mIMBinjH9ZAbiWiVxsizC5mU_> |
| **Organisational Structure** | Video | Video explaining and outlining the various types of organisational structure with types and examples. Also has useful quizzes and worksheets | [www.study.com](http://www.study.com) | <http://study.com/academy/lesson/what-is-organizational-structure-of-management-types-examples-quiz.html> |
| **Traditional SDLC models** | Tutorials | Tutorials on traditional SDLC models such as the Waterfall, V-Shaped, Incremental and Spiral Method Models |  | <http://www.tutorialspoint.com/sdlc/index.htm> |
| **Agile Software Development and Project Management** | Book / E-Book | Agile Project Management For Dummies | Mark C. Layton | <http://www.amazon.com/Agile-Project-Management-Dummies-Layton/dp/1118026241/ref=sr_1_2?s=books&ie=UTF8&qid=1445435205&sr=1-2&keywords=agile+project+management> |
| **Traditional Waterfall SDLC**  vs  **Modern Agile Software Development methodology** | Website | A very comprehensive article that outlines the main elements of the traditional Waterfall SDLC and the modern Agile Software Development methodology. Outlines the pros, cons and differences between them | www.codeproject.com | <http://www.codeproject.com/Articles/604417/Agile-software-development-methodologies-and-how-t> |
| **Introduction to UML** | Website | <http://www.tutorialspoint.com/uml>, This is a website that provides and introduction to UML and how it is structured. It goes through the various components and how they interact to create a UML diagram. | [www.tutorialspoint.com](http://www.tutorialspoint.com) | <http://www.tutorialspoint.com/uml> |
| **Use case diagrams** | Book | Use Case Quick Start Guide - Introductory book and all elements and uses of use case diagrams with good examples | Deetta Jennings-Balthazar | <http://www.amazon.co.uk/Use-Case-Quick-Start-Guide/dp/0557416337/ref=sr_1_6?s=books&ie=UTF8&qid=1445516486&sr=1-6&keywords=use+case+basics> |
| **UML and Class Diagrams** | Book / E-Book | Schaum's Outline's UML (Schaum's Outline Series) - A step-by-step guide to the notation and use of UML including class diagrams.. Demonstrates the use of the techniques and notation of UML through case studies in systems analysis, showing the student clearly how UML is used in all kinds of practical situations. | Simon Bennett and John Skelton | <http://www.amazon.co.uk/Schaums-Outlines-UML-Outline/dp/0077107411/ref=sr_1_16?s=books&ie=UTF8&qid=1445502219&sr=1-16&keywords=use+case+modelling> |
| **Creating Class Diagrams** | Website | Very good summary article on creating a class diagram | agilemodelling.com | <http://www.agilemodeling.com/artifacts/classDiagram.htm#Classes> |
| **Java integration with Class Diagrams** | Website | From this link you can download NetBeans IDE (Integrated Development Environment) version 8.0.2.There are a variety of UML plugins available through the software that will allow the user   * Create Java Programs * Create standalone UML Diagrams such as Use Case Diagrams, Class Diagrams and Activity Diagrams * Reverse engineer Java programs into UML Class diagrams * Forward engineer UML Class diagrams into Java Programs | Netbeans.org | <https://netbeans.org/downloads/> |
| **UML integration Net Beans** | Website Tutorial | Tutorial on how to integrate the Visual Paradigm modelling software with Net beans to reverse and forward engineer Java code and class diagrams. | Visual Paradigm | http://www.visual-paradigm.com/tutorials/modelinginnetbeans.jsp |
| **Testing** | E-Book | Software Testing: Essential Skills for First Time Testers: Software Quality Assurance: From scratch to end | Umer W. Ghazali | <http://www.amazon.com/Software-Testing-Essential-Testers-Assurance-ebook/dp/B00ICWK6RK/ref=sr_1_1?s=books&ie=UTF8&qid=1445435808&sr=1-1&keywords=software+testing> |
| **Project Management, Agile Development, Software Architecture, Many others** | Website | Excellent Resource with tutorials on Project Management, Agile Methodologies and many other in the area of Software Architecture and Development | http://www.tutorialspoint.com/ | http://www.tutorialspoint.com/ |
| **Modelling Software** | Website | [www.draw.io](http://www.draw.io), This is a free online diagramming application which allows the user to draw UML diagrams, flowcharts and other general diagrams. These can be linked with and stored directly in google drive | jgraph.com | [www.draw.io](http://www.draw.io) |

**Useful Organisations:**

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| **Name** | **Contact Information** |
| Unified Modeling Language™ (UML®) Resource Page - Official homepage of the UML | http://www.uml.org/ |
| Net Beans Java IDE | https://netbeans.org/ |
| Visual paradigm | http://www.visual-paradigm.com |
| Agile Alliance | http://www.agilealliance.org/ |
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**Other Resources:**

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| **MOOCs (Massive Online Open Courses)** | |
| Online courses delivered mainly by Universities and Colleges worldwide.  Useful to search regularly for new courses and new start dates. Most courses are free. Charge often applies if assessment and certification is required.  Provide excellent CPD for individuals or resources that can support teaching and learning.  ITunes U - Large selection of free and paid courses once you have downloaded and installed the app | What is a MOOC?  <https://www.youtube.com/watch?v=eW3gMGqcZQc>    List of MOOCs  <https://www.mooc-list.com/>  <https://www.coursera.org/>  <https://www.udemy.com/>  <http://www.extension.harvard.edu/open-learning-initiative>  <https://www.uclaextension.edu/pages/search.aspx?c=free+courses>  <http://oyc.yale.edu/>  <http://www.apple.com/education/ipad/itunes-u/> |